

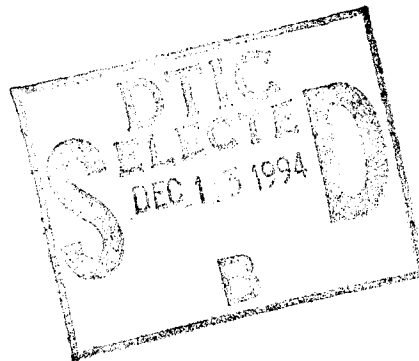
Navy Personnel Research and Development Center

San Diego, CA 92152-7250

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Delayed Entry Program (DEP) Attrition: Recruits, Recruiters, Contracts, and Economics



Michael K. Nakada

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**Delayed Entry Program (DEP)
Attrition: Recruits, Recruiters,
Contracts, and Economics**

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13. ABSTRACT (Maximum 200 words) <p>Attrition from the DEP continues to be a costly problem. It raises recruiting and training costs. This report documents the results of an investigation of historical Navy DEP behavior. It identifies factors that impact DEP attrition, and presents the specification and results of a DEP attrition forecasting model. The factors are grouped into five categories: individual attributes, DEP contract factors, recruiter attributes, economic factors, and other control factors.</p> <p>The individual attributes of the recruit have a significant impact on the probability of attriting from the DEP. Those variables that characterize the DEP contract and are modifications to a contract were also significant indicators of DEP attrition. The results from the recruiter variables were, in general, disappointing. The remaining economic variable produced mixed results.</p> <p>This model can serve as the foundation for a DEP management system that can alert recruiting managers to potential DEP attrition problems.</p>				
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Foreword

This report was prepared as part of the Accession Management project (Program Element 0603707N, Work Unit 0603707N.L1770.MP103), under the sponsorship of the Chief of Naval Personnel (PERS-2). The objective of this project includes the development of a model to forecast attrition in the Delayed Entry Program. The work described here was performed in FY93.

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Summary

Background

Attrition from the Navy's Delayed Entry Program (DEP) trended upward in the 1980s. By October 1990, DEP attrition reached an all time high of 16% (i.e., 15,121 attrites out of 93,915 contracts initiated in FY90). Replacing these lost contracts requires additional recruiting resources, and ultimately, raises the cost per accession.

The Delayed Entry Program was instituted to: (1) give recruits a broader selection of program and school choices, and (2) allow the Navy to level the training input in its recruit and initial skill training facilities. In the first instance, the DEP allows an individual to enter the service at a later date (up to 365 days in the future) while offering him/her the skill training he/she desires. Without the DEP, the recruiter can offer induction only during the shipping cycle and the skill training that is available during that shipping cycle.

Second, the DEP allows the training establishment to more effectively utilize its training resources. Without the DEP, the training establishment experiences substantial variation in its training input from month to month. With the DEP, which schedules the induction of recruits in the future, the Navy can minimize the training input variation.

Objective

The objective of this report is to quantify the impact on DEP attrition of: (1) recruit characteristics, (2) DEP contract specifications, (3) recruiter characteristics, and (4) economic factors.

Approach

A review of previous research on DEP attrition was conducted. Factors that impact DEP attrition were identified and grouped into five categories: individual attributes, DEP contract variables, recruiter attributes, economic variables, and other control variables. Data from several sources were extracted and merged. These sources included the Navy's Personalized Recruiting for Immediate and Delayed Enlistment (PRIDE) system, Navy Personnel Research and Development Center's (NPRDC) Recruiting Information Delivery System (RIDS) and Training Tracking (TRAINTRACK) system, Defense Manpower Data Center's (DMDC) Military Processing Command (MEPCOM) system, and Navy Recruiting Command's (NRC) distance and population density data. A mathematical model was then estimated and validated.

Results

As a group, the individual attributes of the recruit have a significant impact on the probability of attriting from the DEP. For example, males are less likely to attrite than females. Younger recruits also have lower DEP attrition propensities. Relative to whites, blacks are less likely to attrite from the DEP. Looking at the recruit's educational status at the beginning of the DEP

contract, one finds that high school graduates are less likely to attrite than high school seniors. Finally, higher aptitude recruits have lower DEP attrition rates.

Those variables that characterize the DEP contract and are modifications to a contract were also significant indicators of DEP attrition. Increased time-in-DEP raises the likelihood of attriting from the DEP. The three DEP contract modification variables (changes in shipping date, changes in rating, and changes in enlistment program) also increased the likelihood of DEP attrition.

The results from the recruiter variables were, in general, statistically insignificant. The paygrade variable produced the only significant result. Recruits were less likely to attrite if their recruiter was an E-7 or above; however, only one in eight DEP contracts were written by recruiters E-7 and above.

Except for the unemployment variable, the remaining economic variables (dollars expended on various advertising media by Navy Recruiting District (NRD) in the month the contract was initiated) produced mixed results. Higher unemployment rates benefit Navy recruiting, and it was expected to lower DEP attrition rates.

Finally, two variables that indicated the recruit lived in a rural community were statistically significant. The first variable measured the distance from the individual's home to the recruiting station. Greater distances led to lower attrition probabilities. The second variable measured population density around the individual's home. Recruits from areas with high population densities were more likely to attrite.

Conclusions

Individual attributes of the recruit and DEP contract variables are highly significant factors impacting attrition. These results are consistent with previous studies that looked at both Navy and Army DEP attrition. Younger male, high school diploma graduates, with no DEP contract changes, are the least likely to attrite from the DEP. Afro-American recruits also have lower DEP attrition propensities than other ethnic groups. However, the impact of increased time-in-DEP on DEP attrition was one half that found by other researchers. This research finds that a 30-day increase in DEP time increases DEP attrition by 9.1% rather than 18%.

Extending previous research with the inclusion of recruiter and economic variables produced few significant findings. Of all the recruiter characteristics, recruiter paygrade was the only significant factor. Individuals recruited by recruiters E-7 and above were less likely to attrite. Similarly, of all the economic variables, only the county unemployment rate at the time the recruit started the DEP was statistically significant. That is, recruits from areas with higher unemployment rates were less likely to attrite.

This model can serve as the foundation for a DEP management system that can alert recruiting managers to potential DEP attrition problems. For example, at NRC headquarters, managers armed with statistics on the personal characteristics of the entire DEP pool at the end of a month can forecast the number of losses they are likely to experience in the upcoming months.

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Introduction

Background

Attrition from the Navy's Delayed Entry Program (DEP) trended upward in the 1980s. Figure 1 displays the recent trend in DEP attrition. By October 1990, DEP attrition reached an all time high of 16% (i.e., 15,121 attrites out of 93,915 contracts initiated in FY90). Replacing these lost contracts requires additional recruiting resources, and ultimately, raises the cost per accession.

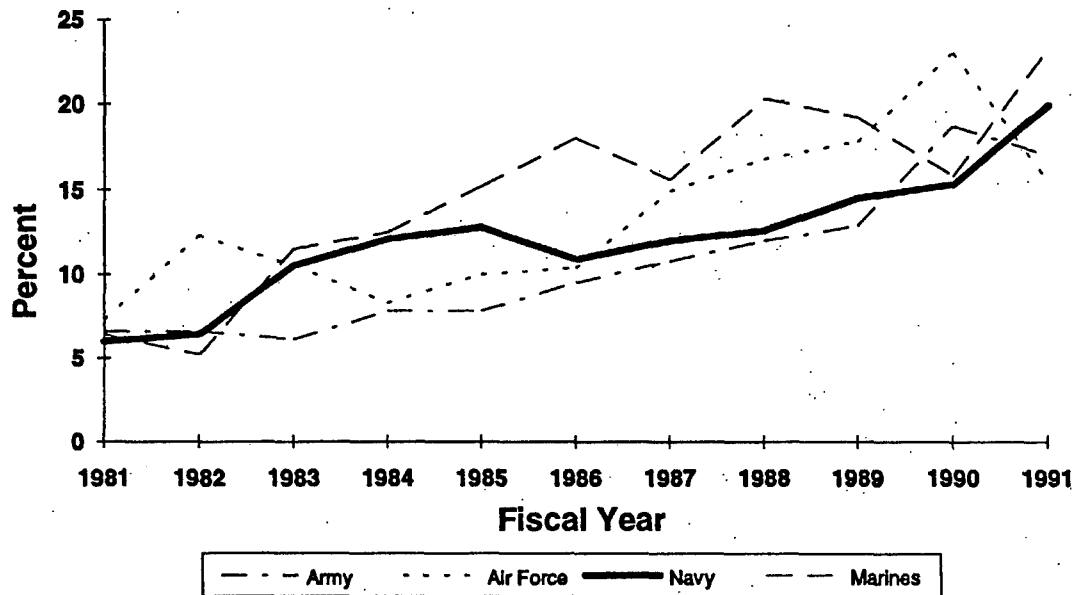


Figure 1. FY81-91 Delayed Entry Program attrition by service.

The Delayed Entry Program was instituted to: (1) give recruits a broader selection of program and school choices, and (2) allow the Navy to level the training input in its recruit and initial skill training facilities. In the first instance, the DEP allows an individual to enter the service at a later date (up to 365 days in the future) while offering him/her the skill training he/she desires. Without the DEP, the recruiter can offer induction only during the shipping cycle and the skill training that is available during that shipping cycle.

Second, the DEP allows the training establishment to more effectively utilize its training resources. Without the DEP, the training establishment experiences substantial variation in its training input from month to month. With the DEP, which schedules the induction of recruits in the future, the Navy can minimize the training input variation.

Objective

This report documents the results of an investigation of historical Navy DEP behavior. It presents a review of selected DEP attrition literature, identifies factors which impact DEP survival, and presents the specification and results of a DEP attrition forecasting model.

Literature Review

The services have studied DEP attrition since 1985. The research focused on determining the factors that affect DEP attrition, developing DEP policies, and forecasting DEP attrition. The Army Research Institute (ARI) developed a model to predict DEP loss. Using a micro- or individual-level data set, Phillips and Schmitz (1985) estimated a logistic model of Army DEP attrition for high school seniors (HSSR). Another logistic model combined high school graduates (HSDG) and nonhigh school graduates (NHSG). Both the HSSR and HSDG/NHSG models had a time-in-DEP elasticity of one. This implied that a one-month increase in DEP length increased DEP attrition by 27%. In both models, females had higher propensities to attrite while younger recruits were less likely to attrite. Aptitude (measured by the score on the Armed Forces Qualification Test (AFQT)) produced mixed results. High school graduates and nonhigh school graduates with higher aptitudes were less likely to attrite while results for seniors were inconclusive.

Initial research on Navy DEP attrition conducted by the Center for Naval Analyses (CNA) (Quester and Murray, 1986) produced similar results. Based on an individual-level data set developed from the Navy's Personalized Recruiting for Immediate and Delayed Entry (PRIDE) system, Quester/Murray found a DEP attrition elasticity with respect to time-in-DEP of 1.2. Females and older enlistees were more likely to attrite, and the AFQT results were inconclusive. Certain shipping months significantly affected DEP attrition. Those slated for shipment during May were more likely to attrite while those with October shipping dates had lower attrition propensities. The availability of "better" training opportunities (i.e., "A" schools) for those who ship in October is one possible explanation for these date-of-shipment differences. Finally, Quester/Murray found that as the average number of recruits in the DEP per recruiter increases, the likelihood of individuals attriting increases. The average number of recruits in the DEP per recruiter was a proxy for the amount of energy the recruiter could devote to each recruit in his/her DEP. Thus, it was expected that an increase in this variable, which indicates that a recruiter is spreading himself/herself "too thin", would lead to an increase in DEP attrition. The research described later in this report builds on the Quester/Murray study.

Using a more current version of the Phillips/Schmitz micro-date set, two other ARI researchers incorporated unemployment rates and military/civilian pay ratios (Kearl and Nelson, 1990). Unlike the earlier effort, separate logistic models were estimated for high school graduates and nonhigh school graduates. Models for high school seniors (HSSR) and the three subsamples combined were estimated. For the full sample, the DEP attrition elasticities with respect to the unemployment rate and the pay ratio were -.30 and -.46 respectively. In other words, a 10% increase in the unemployment rate led to a 3% decrease in DEP attrition. Similarly, a 10% increase in military pay relative to civilian pay implied a 4.6% decrease in DEP attrition. Among the subsamples, the DEP attrition elasticity with respect to the unemployment rate ranged from -.92 for HSSRs to -.22 for HSDGs. With respect to the pay ratio, the DEP attrition elasticity ranged from -.81 for HSSRs to -.16 for NHSGs. Here, a 10% increase in the unemployment rate or military pay had a larger impact on seniors than graduates.

In 1991, Cooke and Pflaumer at CNA conducted a review of the DEP attrition research, including the efforts mentioned above. Much for what has been found in this DEP research can be explained as the outcome of individuals learning about a job through experience. The review also includes research on the relationship between time-in-DEP and first-term attrition. The results of their research show a robust, negative relationship—increasing the time individuals spend in the DEP lowers their first-term attrition.

In summary, previous research has shown that increasing time-in-DEP increases the likelihood of attriting from the DEP and lowers the likelihood of attriting during the first-term. The research also shows that women have higher DEP and first-term attrition propensities. Just as high school graduates have lower first-term attrition, they also have lower DEP attrition. To a lesser degree, higher AFQT individuals have lower DEP and first-term attrition.

Data Development

The research discussed in this report relies primarily on the Navy's PRIDE system. The other data sources used included the Navy Personnel Research and Development's Recruiting Information Delivery System (RIDS) and Training Tracking (TRAINTRACK) system, Defense Manpower Data Center's Military Entrance Processing Command (MEPCOM) system, and Navy Recruiting Command's (NRC) distance and population density data.

PRIDE

PRIDE contains data on all individuals who have contracted to enter the Navy (regardless of whether they ultimately enter the Navy). PRIDE is composed of two files: the RESERVATION file and the CANCELLATION file. (Each of these files is discussed below.) From these files an individual's DEP history can be constructed. These data can then be used to explore the impact of personal characteristics on DEP behavior.

When an individual decides to enlist in the Navy, he/she first contracts to "ship" (to be accessed into the Navy) in the current month or at some future date no more than 365 days from the current month and day. For example, on June 12, 1992, the individual can contract to ship sometime in June 1992 or in the future but no later than June 11, 1993. June 12, 1992 is known as the "reservation date", and the date that is negotiated for shipment is known as the "current enlistment date." From these PRIDE data, time-in-DEP was calculated as the difference between the reservation date and current enlistment date on the last record. Other personal data about the potential recruit including date of birth, race/ethnicity, current education status, and gender are recorded on the RESERVATION file.

Anytime an individual cancels his/her reservation, a record is written to the PRIDE CANCELLATION file. This record is identical to the RESERVATION record except for: (1) the

cancellation date field is filled in reflecting the transaction date and (2) the CANCELLATION code field is filled in showing the reason why the reservation was cancelled. In many instances, the individual will make a new reservation.¹

DEP attrition can be defined in several ways. For the purposes of this research, an individual is considered to have attrited from the DEP if his/her reservation and cancellation records occur in different months and no new contract results from the cancelled contract. This is also known as "out-month" DEP attrition.² It is important to note that a person who successfully completes the DEP and "ships" may have records in the CANCELLATION file. If these cancellation records were the result of changes in shipping date, enlistment program, rating, fleet assignment or enlistment term, then the individual is not considered to have attrited from the DEP.³

PRIDE RESERVATION and CANCELLATION files from May 1987 through June 1992 were merged to create a single record which chronologically depicts an individual's DEP history. Missing data elements in the records prevented some of the data from being used. A missing final record made it difficult to tell whether the individual was still in the DEP or had attrited. In this case, other data were used to complete the record. Active records (records of those still in the DEP) were not used in this effort.

One final note regarding these PRIDE data: in addition to the individual background factors, like age and education, the PRIDE system also provides the Social Security Number (SSN) of the recruiter and the recruiting station identification number. These last two pieces of information were essential to the creation of the recruiter and economic variables used in this research. The development of these variables is discussed below.

TRAINTRACK

The TRAINTRACK system was used to supplement the information contained in PRIDE.⁴ The Enlisted Master File (EMF) database within TRAINTRACK helped complete records where PRIDE was incomplete and provided characteristics on recruiters. When an incomplete PRIDE record was encountered, the EMF, which contains data on all active duty enlisted personnel was searched. If an EMF record was found, the individual was counted as a shipper. Time-in-DEP was calculated as the difference between the reservation date and the current enlistment date on the PRIDE record. If a record was not found on TRAINTRACK and the current enlistment date on PRIDE was prior to June 1992 (the as-of date of the TRAINTRACK file), then the individual was counted as a DEP attrite. Again, time-in-DEP was calculated as the difference between the

¹ Changes in shipping date, enlistment program, rating/occupational specialty, fleet assignment or term of enlistment typically will result in a new contract and hence a new reservation record. Cancelled reservations for academic reasons, adaptability/compatibility reasons, personality disorders, criminal offenses, medical reasons, erroneous enlistment, pregnancy, and, of course, death will not result in a new contract.

² This is contrasted with "in-month" attrition which is defined as reservation and cancellation records occurring in the same month. "In month" attrition was eliminated from this study because of the potential for inaccuracies in the data.

³ A special type of "shipper" is the individual whose reservation records, cancellation records, and shipping date to bootcamp are all in the same month. This is known as a "direct ship." Individuals in this category were included in the research described in this report.

⁴ TRAINTRACK is a system of databases and a database management system. The databases primarily contain entity-level enlisted manpower and training data. An extract from PRIDE is also part of TRAINTRACK.

reservation date and the current enlistment date on the PRIDE record.⁵ Finally, if the PRIDE SSN was not on TRAINTRACK and the current enlistment date was past June 1992, the record was discarded. In this case, the individual's final outcome, ship or attrite, could not be determined.

TRAINTRACK broadened the scope of this DEP attrition research by allowing recruiter characteristics to be paired with the information for each recruit contained in PRIDE. Using the recruiter SSN, recruiting station identification number and the recruit's reservation date from PRIDE, a SSN, Unit Identification Code, and date match was again made against the TRAINTRACK system. Recruiter characteristics such as race/ethnicity, mental category, rating, paygrade, total time at current recruiting station, and total time at all recruiting activities were developed. Except for race/ethnicity and mental category, all recruiter variables were measured at the time of the recruit's reservation date. Thus, for the first time, the interaction between recruit and recruiter could be studied.

RIDS

Navy Recruiting District (NRD) unemployment and advertising data for each month and year, May 1987 through September 1991, were extracted from RIDS and appended to each record.⁶ Four unemployment variables were developed for model estimation: (1) the unemployment rate in the month of the recruit's reservation date, (2) a 12-month average unemployment rate for the 11 months preceding and including the month of the recruit's reservation date, (3) the unemployment rate in the month prior to the month the individual shipped or attrited, and (4) a 12-month average unemployment rate for the 11 months preceding and including the month the individual shipped or attrited. Four similar variables measuring advertising dollars were also developed. In addition, Navy advertising dollars by media (e.g., radio, newspaper) were also studied.

MEPCOM and NRC Distance/Density Databases

Finally, the 444,041 observations were merged by SSN with MEPCOM data, and the ZIP code of the home of record was appended to each record. From NRC's Distance/Density database, population density by ZIP code and distance from the home of record to the nearest recruiting station were merged by ZIP code to the data set. Cases with missing population density or distance data were deleted from further analysis.

DEP Attrition: Descriptive Information

The database development procedures described above resulted in 296,551 usable records. For this sample, 251,398 or 84.8% fulfilled their DEP contracts and entered the Navy (shipped), while 45,153 or 15.2% attrited. Descriptive information about these data are detailed below and displayed in Tables 1 through 4.

In Table 1, DEP attrition is broken down by individual recruit characteristics. The 11.4 percentage point difference between males/females shown here is almost identical to the 11.6% difference in DEP attrition rates by gender found by Quester/Murray.

⁵ Consistent with the definition of DEP attrition above, records classified as in-month attrition identified with PRIDE and TRAINTRACK data were not included in the database.

⁶ RIDS is a PC-based system containing historical recruiting and economic data at the NRD level.

Table 1
DEP Attrition by Recruit Characteristics
(N=296,551)

Characteristic	No. of Attrites	No. of Shippers	% Category Attrition*	% Total Attrition**
Gender				
Male	36,064	224,460	13.84	79.87
Female	9,089	26,938	25.23	20.13
Education-DEP Start				
HSDG	19,183	142,542	11.86	42.48
HSSR	23,934	92,491	20.56	53.01
NHSG	2,036	16,365	11.06	4.51
Age-DEP Start				
17	6,105	28,796	17.49	13.52
18	15,068	79,520	15.93	33.37
19	9,521	56,144	14.50	21.09
20	4,884	31,220	13.53	10.82
21+	9,575	55,718	14.66	21.20
Mental Category				
I	1,978	11,060	15.17	4.38
II	14,564	85,392	14.57	32.25
IIIU	10,099	57,666	14.90	22.37
IIIL	15,608	79,061	16.49	34.57
IVA	2,904	18,219	13.75	6.43
I-IIIU	26,641	154,118	14.74	59.00
IIIL-IVA	18,512	97,280	16.00	41.00
Race/Ethnic				
White	30,616	170,849	15.20	67.81
Afro-American	8,488	49,333	14.68	18.80
Hispanic	4,611	23,489	16.41	10.21
Other	1,438	7,727	15.20	3.18

Notes. DEP = Delayed Entry Program, HSDG = high school graduate, HSSR = high school senior, NHSG = nonhigh school graduate.

*Percentages in this column are generated by dividing the number of attrites by the sum of the number of attrites and number of shippers, for example, 36,064/(36,064 + 224,460).

**Percentages in this column are generated by dividing the number of attrites by 45,153, the total number of attrites from the sample, for example, 36,064/45,153.

While the DEP attrition rate for high school diploma graduates is similar in both efforts (11.2% in Quester/Murray and 11.9% here), the DEP attrition rate for high school seniors has risen significantly. The 20.6% DEP attrition rate for seniors reported here is 6.6 percentage points higher than reported by Quester/Murray. There are 161,725 high school diploma graduates and 116,425 high school seniors. Despite this difference in the number of graduates and seniors, the 20.6% DEP attrition rate for seniors led a larger number of seniors among all the attrites. That is, seniors constitute 53% of all the attrites.

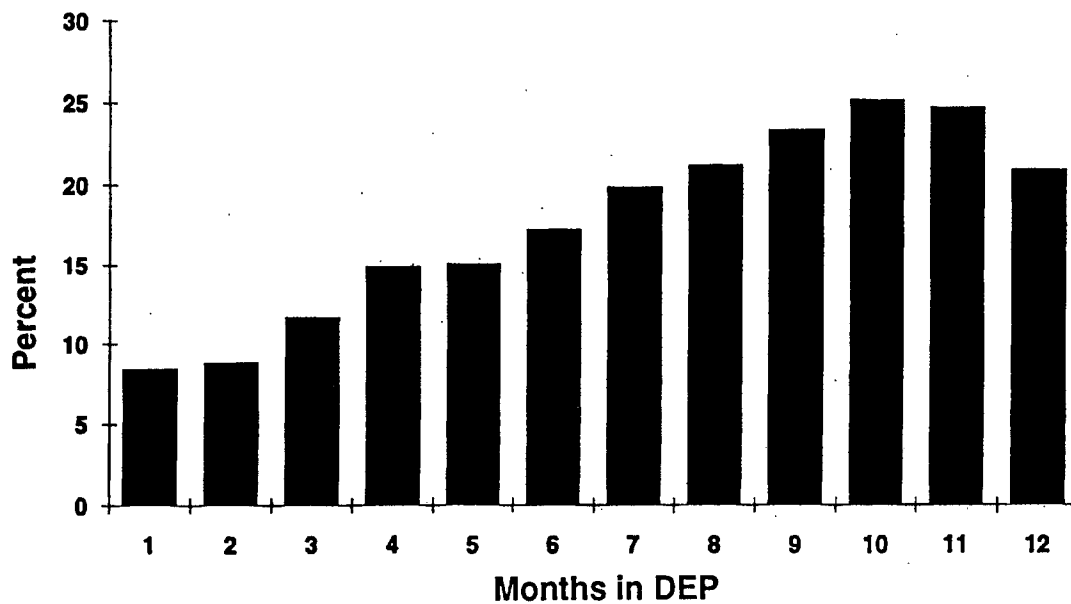
The implied age difference between seniors and graduates translates into different DEP attrition behavior. Table 1 displays the impact under "Age-DEP Start." Because a DEP contract can be as long as 12 months with changes to that contract extending it beyond one year, the age of the individual at the start of his/her contract is the best point to observe the impact of age differences. Again, those individuals more likely to be seniors (17-18 years old) have higher DEP attrition rates. The DEP attrition rate declines with age but rises again for those over 21 years of age.

The measure of aptitude, mental category, reveals an interesting, if not surprising, result: those in mental category I, II, or IIIU have lower DEP attrition rates. Splitting the sample into two groups, mental category I, II, or IIIU and mental category IIIL or IV, revealed a 1.3 percentage point difference in DEP attrition rates, that is, mental categories I to IIIU had a DEP attrition rate of 14.7% while mental categories IIIL or IV had a 16.0% attrition rate.

DEP attrition rates by race/ethnic group (a characteristic not found in the Quester/Murray report) are also shown in Table 1. Afro-American recruits have slightly lower DEP attrition rates, which may be attributed to lower civilian job opportunities that make Navy life relatively more appealing.

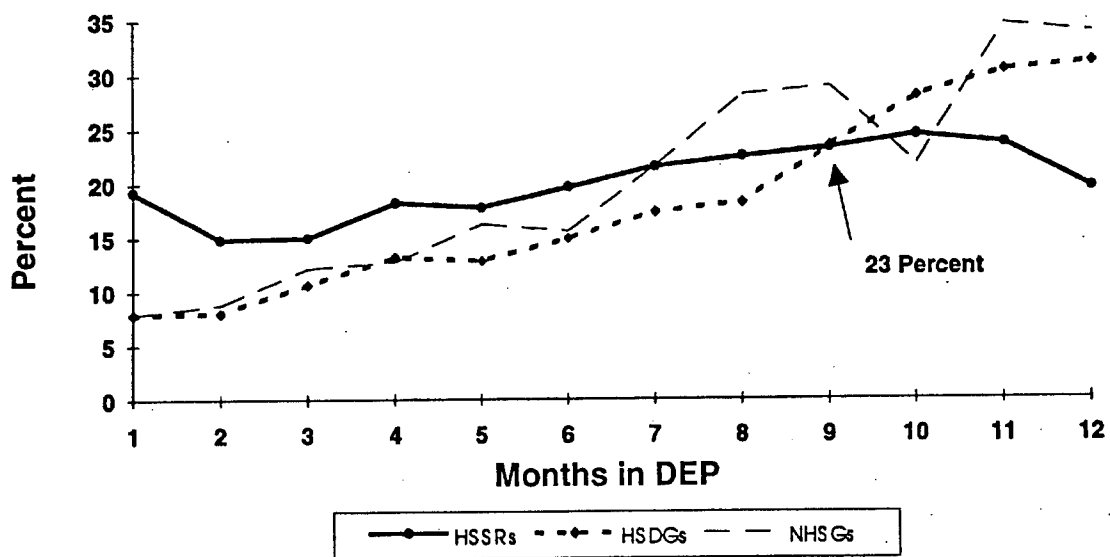
Figure 2 shows that longer time-in-DEP increases DEP attrition. That is, the longer an individual stays in the DEP, the probability of that person attriting from the DEP grows. The rise in DEP attrition rates between one and six months time-in-DEP reported here is more dramatic than that found in Quester/Murray. Here, DEP attrition rates more than double from 8.4% for those with one month time-in-DEP to 17.2% for those with six months time-in-DEP. Quester/Murray, on the other hand, found a 7.2% attrition rate for those with one month time-in-DEP and 11.2% attrition rate for those with six months time-in-DEP.

The total sample was subdivided by educational status at the beginning of the contract. Figure 3 depicts DEP attrition by time-in-DEP for seniors, graduates, and nongraduates. Between HSSRs and HSDGs, the following observations are made. First, from one to eight months, the DEP attrition rate for HSSRs is higher than HSDGs. After nine months in DEP, the HSSR and HSDG rates are equal. Second, the DEP attrition rate for HSSRs with four months in DEP is approximately equal to the DEP attrition rate of HSDGs with eight months in DEP. From one to nine months, the DEP attrition rate for HSDGs increases approximately 2.5 times as fast with increased DEP length as it does for HSSRs. Because of the small sample of NHSGs, a table of DEP attrition by time-in-DEP is presented in Appendix C, but reliable comparisons to the other two groups cannot be made.



DEP = Delayed Enlistment Program

Figure 2. DEP Attrition by Months in DEP.



DEP = Delayed Enlistment Program

Figure 3. DEP Attrition by Months in DEP by Beginning Educational Status.

High school graduates are more likely to enter into a DEP contract in the summer following a June graduation or in January following a December graduation. High school seniors are more likely to contract in November and December after the usual fall college application submission period and in the spring when college acceptances are sent. Figure 4 shows DEP attrition rates by month of entry in the DEP. The higher DEP attrition for those who contracted in the summer months may reflect the successful civilian job opportunities found by high school graduates.

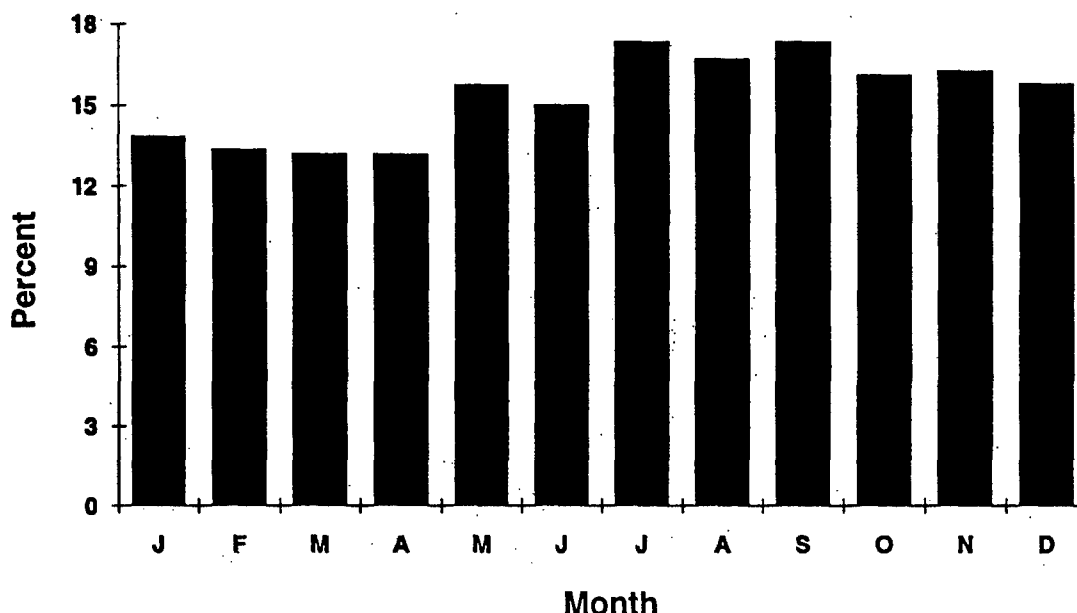


Figure 4. Delayed Entry Program (DEP) Attrition by Month Entered DEP.

DEP contracts can be initiated in any month for a maximum length of 365 days. Changes to that contract during the contract period up to the day of shipping can be negotiated, and a contract can be changed more than once. Further, contract changes can be initiated by the individual recruit or by the Navy. Contract changes include shipping date changes, occupational specialty/rating changes, and accession program changes. These changes can be related. For example, a change in rating could lead to a change in shipping date depending on school seat availability. Only the primary reason for the change in contract is recorded in PRIDE. In the example above, a change in rating would be recorded in PRIDE as the reason for the contract change.

Table 2 shows that a larger number of contract changes leads to higher likelihood of DEP attrition. Quester/Murray also found that individuals with more PRIDE transactions, implying more contract changes, had higher DEP attrition rates. Across the three different types of contract changes listed in Table 2, there appears to be little difference in attrition behavior between those with no contract changes and those with one change. The difference in attrition behavior becomes noteworthy for those with two or more changes.

By merging PRIDE and TRAINTRACK data, the recruiter's characteristics and their effect on their recruit's DEP behavior were examined for the first time. Again, the recruiter's characteristics were recorded as of the date a particular contract was initiated. Hence, the same recruiter prospecting and initiating another contract later on could be in a higher paygrade and would most likely have had more recruiting experience. The data summarized in Table 3 reveal no distinct DEP attrition pattern. It should be noted that most recruiters were white, male petty officers who scored in the upper half on the AFQT. The average number of quarters of recruiting was 5.7 quarters at their present recruiting station. (See Table 5 for the means of the recruiter variables.)

Table 2
DEP Attrition by Changes in Shipping Date, Rating and Program
(N = 296,551)

Characteristic	No. of Attrites	No. of Shippers	% Category Attrition*	% Total Attrition**
Shipping Date				
0	36,282	216,310	14.36	80.35
1	4,621	29,900	13.39	10.23
2	3,538	4,269	45.32	7.84
3+	712	919	43.65	1.58
Rating				
0	44,492	248,390	15.19	98.54
1	462	2,769	14.30	1.02
2	183	208	46.80	.40
3+	16	31	34.04	.04
Program				
0	39,740	226,564	14.92	88.01
1	3,192	2,646	12.85	7.07
2	1,862	2,619	41.55	4.12
3+	359	569	38.68	.80

Notes. DEP = Delayed Entry Program

*Percentages in this column are generated by dividing the number of attrites by the sum of the number of attrites and number of shippers, for example, $36,282 / (36,282 + 216,310)$.

**Percentages in this column are generated by dividing the number of attrites by 45,153, the total number of attrites from the sample, for example, $36,064 / 45,153$.

Table 4 shows that high school seniors are affected the most by civilian unemployment. Kearl and Nelson (1990) reported that new job entrants, like high school seniors, have limited job market information, are more likely to be influenced by additional information, and are likely to change their career decisions more frequently as a result. High school graduates, on the other hand, have more job market information because of their job searching activities. The effect of additional job market information, then, will have less impact on their career decisions. As a result, the differences in DEP attrition rates between high school seniors and graduates by recruiting district unemployment rate depicted in Table 4 are not unexpected. Again, because of the small sample of NHSGs, reliable comparisons to the other groups in Table 4 cannot be made.

Table 3
DEP Attrition by Changes in Shipping Date, Rating and Program
(N = 296,551)

Characteristic	No. of Attrites	No. of Shippers	% Category Attrition*	% Total Attrition**
Gender				
Male	43,572	242,635	15.22	96.50
Female	1,581	8,763	15.28	3.50
Race/Ethnicity				
White	32,970	186,615	15.01	73.02
Afro-American	7,853	42,286	15.66	17.39
Hispanic	1,963	10,037	16.36	4.35
Other	2,367	12,460	15.01	5.24
Mental Category				
I-IIIU	31,955	179,224	15.13	70.77
IIIL	13,198	72,174	15.13	29.23
Paygrade-DEP Start				
E4-E6	39,797	219,928	15.32	88.14
E7-E9	5,356	31,470	14.54	11.86
No. of Quarters Recruiting-DEP Start				
0	1,360	7,995	14.54	3.01
1	4,393	24,274	15.32	9.73
2	4,813	26,556	15.34	10.66
3	4,782	26,612	15.23	10.59
4	4,683	25,619	15.45	10.37
5	4,338	23,811	15.41	9.61
6	3,945	21,765	15.34	8.74
7	3,618	19,759	15.48	8.01
8	3,142	18,220	14.71	6.96
9	2,788	15,229	15.47	6.17
10	2,424	13,851	14.89	5.37
11	1,974	11,087	15.11	4.37
12	1,154	6,542	14.99	2.56
13+	1,744	10,078	14.75	3.86

Notes. DEP = Delayed Entry Program

*Percentages in this column are generated by dividing the number of attrites by the sum of the number of attrites and number of shippers, for example, $43,572/(43,572 + 242,635)$.

**Percentages in this column are generated by dividing the number of attrites by 45,153, the total number of attrites from the sample, for example, $36,064/45,153$.

Table 4
DEP Attrition by District of Unemployment Rate

Unemployment Rate at DEP Start	HSSR Attrited		HSDG Attrited		NHSG Attrited	
	No.	%	No.	%	No.	%
2, <3	184	20.11	112	14.38	9	6.62
3, <4	2,273	21.29	1,499	12.18	209	12.89
4, <5	5,061	41.94	3,381	11.91	372	10.95
5, <6	7,842	20.88	5,922	12.05	604	10.81
6, <7	4,315	19.68	3,719	11.48	400	11.03
7, <8	2,549	19.78	2500	12.07	252	11.48
8, <9	1,063	18.70	1,127	11.05	109	9.54
9, <10	351	18.21	448	11.47	51	13.21
10,<11	189	16.15	292	11.52	22	9.61
11+	107	17.12	183	13.79	8	10.31

Notes. DEP = Delayed Entry Program, HSSR = high school senior, HSDG = high school graduate, NHSG = nonhigh school graduate.

Model and Results

DEP Attrition: Logit model results

The objective of this research was to develop a DEP attrition forecasting model. However, modelling the probability of attriting from the Delayed Entry Program becomes a problem when the data contain only the dichotomous events of shipping and attriting. Estimating these discrete outcome models using ordinary least squares regression yields inefficient estimates. Moreover, tests of significance of the parameters do not apply because the error term has a discrete distribution rather than a normal distribution. Finally, predicting with a regression model can lead to values outside the implied probability interval from 0 to 1.

While inefficient parameter estimates and discrete distribution problems can be overcome with large enough samples, probit and logit estimation methods, which restrict estimated probabilities to the zero-one interval, are more appropriate. The probit technique assumes a normal distribution while the logit assumes a logistic distribution. While these distributions are quite similar, actual computation using large samples favors the logit method.

With the logit model, the probability of an individual attriting the DEP is given by:

$$P(\text{attriting}) = \frac{1}{1 + e^{-BX}},$$

where B is the vector of coefficients to be estimated and X is a vector of covariates, which includes individual and recruiter characteristics and socioeconomic variables.

The iterative process by which maximum likelihood techniques derive parameter estimates for a logit model restricts the sample size. The large number of model parameters led to a 20% sample (59,003 observations out of a total of 296,551) being used in this analysis. Appendix A contains the variables list, their range of values, and sources.

Table 5 displays the results from estimating the model described above. Included with the parameter estimates are the *t*-statistics, the probability of attriting from the DEP with respect to the variable, and the variable means. The variables are grouped into five categories: individual attributes, DEP contract variables, recruiter attributes, economic variables, and other control variables.

As a group, the individual attributes of the recruit have a significant impact on the probability of attriting from the DEP. Males are much less likely to attrite than females. That is, the estimated DEP attrition rate for males was 13%, while females experienced a 22% DEP attrition rate. This result is consistent with various studies. Quester/Murray, for example, found a significant, negative coefficient on their gender variable (MALE=1, if the recruit was male, and MALE=0, if the recruit was female). Quester/Murray and Kearn/Nelson have also found that all else equal, younger recruits have lower DEP attrition propensities. In this effort, the DEP attrition rate declined gradually with decreasing age at DEP entry. Finally, relative to whites, blacks are less propensed to attrite from the DEP.

Only 6% of the sample were nonhigh school graduates at the beginning of their DEP contract. If the nonhigh school graduates recruiting goal and total recruiting goal were to remain fixed, then increasing the number of HSSR DEP contracts will be at the expense of the number of HSDG DEP contracts. Under this assumption, one would expect an increase in the DEP attrition rate due to the increase in HSSR DEP contracts. At the same time, a roughly equal increase in the DEP attrition rate would be expected from the decrease in HSDG DEP contracts.

The AFQT variable is the only continuous (vice dichotomous) individual attribute, and, as others have found, higher aptitude recruits have lower DEP attrition rates. The effect of increasing the recruit quality by raising the AFQT score has a small effect on lowering the DEP attrition rate; the elasticity is -.13. From the sample mean, it would take a 30-point rise in the mean AFQT to lower DEP attrition one point.⁷

Those variables that characterize the DEP contract and are modifications to a contract were also significant indicators of DEP attrition. Time-in-DEP measured in days (variable is DAYS) had a significant, positive impact on DEP attrition; the elasticity is .46. Thus, with an average of 151 days, or five months in DEP, an increase of 30 days, or one month, would increase the DEP attrition rate by 1.4 percentage points. Thus, in this sample of 296,551 recruits, an increase of one month in DEP length would have meant an additional 4,074 attrites.

The three DEP contract modification variables, changes in shipping date (ROICNT), changes in rating (ROJCNT), and changes in enlistment program (ROKCNT), also increased the likelihood of DEP attrition. Recall that contract modifications record the primary reason for the change.

⁷ $dP/dx = -.000345$, or $dP = -.000345 dx$. If $dx = 30$, then $dP = -.010$.

However, the primary reason for the contract change could also lead to other contract modifications. Examining the sample means of ROICNT, ROJCNT, and ROKCNT indicates that DEP contract modifications are the exception rather than the rule.

The number of changes in shipping date (ROICNT) had the largest impact. A shipping date change that moves up the shipping date from what was originally contracted may result in losing the school seat for the desired training. As the shipping date approaches, school seats are at a premium, and those seats still available are usually the less desirable ones. If job skills training is the motivation for enlisting, then the resulting, less-desirable training would increase the propensity to attrite. A shipping date change that moves the shipping date to a date farther in the future than what was originally contracted increases the time-in-DEP, which in turn increases the likelihood of attriting.

Changes in shipping date can be initiated by either the recruit or by the Navy. In late 1991, the Navy pushed November and December shipping dates into the following calendar year. The result was higher attrition from the DEP. The variable POLICY attempts to capture the impact of this Navy initiative. The coefficient is positive and significant. As a matter of policy, the Navy does not like to "break a contract." In this case, the Navy "broke" or modified the contract to ship at some later date. This action can tarnish the Navy's image with those who are directly affected. In addition, potential recruits may learn (from those affected) that the Navy does not "keep its promises."

Individuals change their enlistment program (ROKCNT) to achieve a better job/career match. Those with less job market experience, like HSSRs, have more changes in enlistment program. Two or more changes in enlistment program may indicate an underlying employee/employer mismatch that ultimately results in the recruit attriting the DEP.

The remaining contract variables had smaller or insignificant effects on DEP attrition. The SHORE variable, which captures whether or not the contracted rating is a shore-intensive or sea-intensive rating, was not significant. Further, the number of modifications in one's DEP contract for rating changes, ROJCNT, had a small positive, significant effect on DEP attrition.

The monthly variables, which capture the month the recruit started the contract, had mixed results. Relative to January, those who contract in February, March, and April had lower attrition propensities. This three-month period may not be a particularly good time of the year for employment. Those who find job hunting unrewarding during February, March, and April, may find the Navy relatively more rewarding and are therefore less likely to attrite.

The results from the recruiter variables were, in general, disappointing. The CPO variable produced the only significant result. Recall that recruiter paygrade (CPO) and recruiting experience (RECQTR) were developed in an attempt to capture the effects of the recruiter's overall Navy experience/seniority and recruiting experience on the probability of a individual attriting from the DEP. Only one in eight DEP contracts were written by recruiters E-7 and above, and these recruits were less propensed to attrite.

Except for the UNEMP variable, the remaining economic variables (dollars expended on various advertising media by NRD in the month the contract was initiated) produced mixed results. Using macro data to explain individual behavior may be too much to ask. Moreover, the mechanism by which macro advertising expenditures translates into advertising impressions

received and retained is unclear. Finally, the Navy did not expend advertising dollars for all types of media in all years for which this effort has data. In the fiscal year models reported in Appendix B, no estimated coefficients are reported for those advertising media with zero expenditures.

The UNEMP variable measures the unemployment in the Navy recruiting district experienced by the recruit at the time the DEP contract was initiated. Higher unemployment rates benefit Navy recruiting, and it was expected to lower DEP attrition rates. The UNEMP coefficient is negative and significant yet small, $-.12$. Thus, with an average unemployment rate of 5.9%, an increase to 6.9% would decrease the DEP attrition rate by 2%.

The last two control variables identify whether the individual lived in an urban or rural location. DISTANT measures the distance from the recruit's home, identified by ZIP code, to the nearest recruiting station, also identified by ZIP code. DENSE measures the population density around the recruit's home, again identified by ZIP code.

Two observations help explain why the DISTANT coefficient is negative and significant. First, recruiters may not spend much time prospecting in rural areas. Also, recruits from rural backgrounds may seek out the Navy instead, an indication that they may have relatively "higher tastes for the military", and therefore, are less propensed to attrite the DEP.

Similarly, the DENSITY variable is positive and significant. Recruits from rural areas have population densities less than that of their urban counterparts. Lower population densities experienced by a recruit identify him/her as coming from a rural environment.

To test the stability of the parameter estimates (i.e., to determine if there were significant differences in recruits across time), the sample was divided into five fiscal year cohorts. Each sample member was assigned to a cohort based on his/her reservation date. The same model was then estimated for each cohort. The results are reported in Appendix B. Across the cohorts, the coefficients of the individual attributes did not all remain constant over this time period.

The model presented in Table 5 was validated using the remaining 80% of the sample (237,548 observations). For each individual, a predicted outcome was computed and compared to the actual outcome. These results are presented in Table 6. In more than 99% of the cases, the model predicted survival. This is due to the homogeneity of the sample. While the fraction of concordant attrition outcomes is less than 1%, the fraction of concordant survival outcomes exceeds 84%. The actual sample survival rate was 85%. Again, when the model erred, it predicted survival in nearly 15% of the cases where there was actual attrition.

Table 5
DEP Attrition: Logit Model Results and Variable Means

Variable	Coefficient	(T-Stat)	dp/dx: Slope of Conditional Mean Function	Mean
Individual Attributes				
MALE	-.764	(-23.193)	-.985E-01	.881
HSSR	.335	(5.449)	.432E-01	.393
HSDG	-.372	(- 6.493)	-.479E-01	.545
AGE 17	-.85	(-16.603)	-.110	.119
AGE 18	-.638	(-15.749)	-.822E-01	.320
AGE 19	-.282	(- 7.363)	-.364E-01	.219
AGE 20	-.158	(- 3.572)	-.203E-01	.122
BLACK	-.111	(- 3.219)	-.143E-01	.198
HISP	-.138E-01	(-.327)	-.178E-02	.096
AFQT	-.268E-02	(- 4.174)	-.345E-03	57.597
DEP Contract Variables				
DAYS	.360E-02	(24.444)	.464E-03	150.662
SHORE	.322E-02	(.110)	.416E-03	.205
ROICNT	.480	(23.886)	.619E-01	.188
ROJCNT	.280	(2.649)	.268E-01	.014
ROKCNT	.328	(13.247)	.423E-01	.126
FEB	-.312	(- 3.843)	-.403E-01	.085
MAR	-.251	(- 3.606)	-.324E-01	.091
APR.	.279	(- 4.272)	-.359E-01	.087
MAY	-.625E-01	(-.922)	-.806E-02	.083
JUN	-.132	(- 1.848)	-.170E-01	.097
JUL	.130E-01	(.182)	.168E-02	.089
AUG	-.902E-01	(- 1.253)	-.116E-01	.088
SEP	-.499E-01	(-.773)	-.643E-02	.072
OCT	.729E-01	(- 1.055)	-.940E-02	.060
NOV	-.134	(- 1.853)	-.172E-01	.080
DEC	-.100	(- 1.405)	-.129E-01	.080
POLICY	.463	(2.117)	.596E-01	.002
Recruiter Attributes				
MALER	.110E-01	(.171)	.142E-02	.965
CPO	-.849E-01	(- 2.279)	-.109E-01	.123
RECQTR	-.139E-04	(-.005)	-.179E-05	5.730
BLACKR	.309E-01	(.869)	.398E-02	.169
HISPR	.100	(1.639)	.129E-01	.040
MG13UR	-.359E-01	(- 1.297)	-.463E-02	.714

Table 5 (Continued)

Variable	Coefficient	(T-Stat)	dp/dx: Slope of Conditional Mean Function	Mean
Economic Variables				
UNEMP	-.235E-01	(- 2.893)	-.303E-02	5.934
DIRDOL	-.205E-02	(-.327)	-.264E-03	1.479
NEWDOL	.186E-03	(.024)	.240E-04	3.102
NTVDOL	.802E-03	(1.331)	103E-03	12.146
RADDOL	-.858E-02	(- 3.663)	-.110E-02	3.059
MAGDOL	.101E-01	(2.917)	.130E-02	3.060
MAILDL	-.113E-01	(- 1.779)	-.146E-02	1.580
SUPPDL	-.195E-02	(-.046)	-.251E-03	.034
Other Control Variables				
DISTANT	-.275E-02	(- 3.648)	-.355E-03	11.445
DENSE	.126E-03	(2.546)	.162E-04	104.920
CONSTANT	-.930	(- 6.953)		

DEP Attrition: Summary Statistics

Number of observations	59,003
Number of DEP attrites	8,970
Log of likelihood function	-23482.8

- Notes.** 1. DEP = Delayed Enlistment Program.
2. See Appendix A for attributes and variables definitions.

Table 6

DEP Attrition: Predicted Versus Actual Outcomes

Predicted Outcomes	Actual Outcomes		Total
	Attrite	Survive	
Attrite	581*	776	1357
	.24*	.33	.57
Survive	35,602	200,589*	236,191
	14.99	84.44*	99.43

Notes. DEP = Delayed Enlistment Program.

*Percentages in this table are generated by dividing the number of observations for each predicted-actual outcome pair by 237,548, the total number in the validation sample, for example, 35,602/237,548.

Conclusions

Individual attributes of the recruit and DEP contract variables are highly significant factors impacting attrition. These results are consistent with previous studies looking at both Navy and Army DEP attrition. Younger male, high school diploma graduates, with no DEP contract changes, are the least likely to attrite from the DEP. Afro-American recruits also have lower DEP attrition propensities than other ethnic groups. However, the DEP attrition elasticity with respect to time-in-DEP,⁴⁶ was one half that found by other researchers. This implies that a 30-day increase in DEP time increases DEP attrition by 9.1% rather than 18%.

Extending previous research with the inclusion of recruiter and economic variables produced little. Recruiter paygrade was the only significant factor in lowering DEP attrition. Recruits were less likely to attrite if their recruiter was an E-7 or above.

The county unemployment rate at the time the recruit started the DEP had a small, negative effect on DEP attrition. Kearl/ Nelson found a larger, negative effect.

This model can serve as the foundation for a DEP management system that can alert recruiting managers to potential DEP attrition problems. For example, at NRC headquarters, managers armed with statistics on the personal characteristics of the entire DEP pool at the end of a month can forecast the number of losses they are likely to experience in the upcoming months. Out of the entire DEP pool, those NRDs likely to experience high DEP attrition can be forewarned.

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Appendix A
Logistic Regressions: Variable List

MODEL VARIABLES AND DATA SOURCES

Variable	Values and Description	Data Source
<u>Recruit characteristics</u>		
MALE	1, if male; 0, if female	PRIDE
HSSR	1, if high school senior at entry into DEP; 0, otherwise	PRIDE
HSDG	1, if high school diploma graduate at entry into DEP; 0, otherwise	PRIDE
AGE17	1, if age 17 at entry into DEP; 0, otherwise	PRIDE
AGE18	1, if age 18 at entry into DEP; 0, otherwise	PRIDE
AGE19	1, if age 19 at entry into DEP; 0, otherwise	PRIDE
AGE20	1, if age 20 at entry into DEP; 0, otherwise	PRIDE
BLACK	1, if Black; 0, otherwise	PRIDE
HISP	1, if Hispanic; 0, otherwise	PRIDE
AFQT	Armed Forces Qualification Test score; values between 0 and 99	PRIDE
<u>DEP contract variables</u>		
DAYS	number of days in DEP; values between 1 and 365 days	PRIDE
ROICNT	number of changes in shipping date; values between 0 and 8	PRIDE
ROJCNT	number of changes in rating; values between 0 and 4	PRIDE
ROKCNT	number of changes in program; values between 0 and 6	PRIDE

DISTANT	distance from recruit's home to nearest recruiting station; measured in miles from ZIPcode of recruit's home to recruiting station's ZIP code; values between 0 and 327	CNRC location data; MEPCOM data
DENSE	population density around recruit's home; measured in population per square mile of ZIP code of recruit's home; values between 0 and 3717	CNRC location data; MEPCOM data
POLICY	1, if the initial ship date was 11/1/91 through 12/31/91; 0, otherwise	PRIDE
SHORE	1, if the initial rating was CTA, CTI, CTM, CTO, CTR, CTT, DK, DP, IS, JO, LN, MS, DC, PC, PN, RM, RP, SH, SK, YN, AK, AZ, HM, DT, MU; 0, otherwise	PRIDE
FEB	1, if initial reservation month is February; 0, otherwise	PRIDE
MAR	1, if initial reservation month is March; 0, otherwise	PRIDE
APR	1, if initial reservation month is April; 0, otherwise	PRIDE
MAY	1, if initial reservation month is May; 0, otherwise	PRIDE
JUN	1, if initial reservation month is June; 0, otherwise	PRIDE
JUL	1, if initial reservation month is July; 0, otherwise	PRIDE
AUG	1, if initial reservation month is August; 0, otherwise	PRIDE
SEP	1, if initial reservation month is September; 0, otherwise	PRIDE
OCT	1, if initial reservation month is October; 0, otherwise	PRIDE

NOV	1, if initial reservation month is November; 0, otherwise	PRIDE
DEC	1, if initial reservation month is December; 0, otherwise	PRIDE

Recruiter characteristics

MALER	1, if male; 0, if female	TRAINTRACK
CPO	1, if E7-E9 at time of contract; 0, otherwise	TRAINTRACK
RECQTR	total time in quarters spent in current NRD at time of contract; values between 0 and 53	TRAINTRACK
BLACKR	1, if Black; 0, otherwise	TRAINTRACK
HISPR	1, if Hispanic; 0, otherwise	TRAINTRACK
MG13UR	1, if mental category 1-3U; 0, otherwise	TRAINTRACK

Economic variables

UNEMP	unemployment rate by district in month of initiation of contract; values between 2.6 and 13.2	RIDS
DIRDOL	direct mail dollars by district in month of initiation of contract; FY91 thousands of dollars; values between 0 and 20	RIDS
NEWDOL	newspaper dollars by district in month of initiation of contract; FY91 thousands of dollars; values between 0 and 11.87	RIDS
NTVDOL	total national TV dollars by district spent in month of initiation of contract; FY91 thousands of dollars; values between 0 and 176.9	RIDS

RADDOL	total national radio dollars by district spent in month of initiation of contract; FY91 thousands of dollars; values between 0 and 55.6	RIDS
MAGDOL	total national magazine dollars by district spent in month of initiation of contract; FY91 thousands of dollars; values between 0 and 34.7	RIDS
MAILDL	total national mail dollars by district spent in month of initiation of contract; FY91 thousands of dollars; values between 0 and 15.9	RIDS
SUPPDL	total national supplemental ad dollars by district spent in month at initiation of contract; FY91 thousands of dollars; values between 0 and 7.4	RIDS

Appendix B

**Logistic Regressions: FY87,
FY88, FY89, FY90, FY91 Cohorts**

**DEP ATTRITION: FY87 COHORT LOGIT MODEL RESULTS
AND VARIABLE MEANS**

VARIABLE	COEFFICIENT	(T-STAT)	dp/dx: SLOPE OF CONDITIONAL MEAN FUNCTION	MEAN
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<u>Individual attributes</u>				
MALE	-.871	(-17.275)	-.121	.900
HSSR	.690	(7.997)	.955E-01	.312
HSDG	-.465	(- 5.805)	-.643E-01	.629
AGE17	-1.045	(-14.586)	-.145	.139
AGE18	-.773	(-14.033)	-.107	.345
AGE19	-.232	(- 4.276)	-.321E-01	.200
AGE20	-.630	(- .991)	-.872E-01	.106
BLACK	-.100	(- 1.920)	-.138E-01	.185
HISP	-.121	(- 1.824)	-.168E-01	.082
AFQT	-.197E-02	(- 2.175)	-.273E-01	58.479
<u>DEP contract variables</u>				
DEP	.140E-02	(6.739)	.194E-03	170.092
SHORE	.361E-03	(.008)	.500E-04	.199
ROICNT	.680	(24.805)	.941E-01	.192
ROJCNT	.233	(1.996)	.323E-01	.013
ROKCNT	.398	(11.753)	.548E-01	.132
FEB	-.210	(- 1.116)	-.290E-01	.061
MAR	-.189	(- 1.289)	-.261E-01	.079
APR	-.638	(- 4.169)	-.883E-01	.098
MAY	.242E-01	(.177)	.335E-02	.108
JUN	-.227	(- 1.468)	-.314E-01	.135
JUL	.693E-02	(.045)	.959E-03	.135
AUG	-.119	(- .768)	-.164E-01	.130
SEP	-.126	(- .789)	-.174E-01	.113
OCT	-	-	-	-
NOV	.257	(1.414)	.356E-01	.040
DEC	.210	(1.257)	.291E-01	.047
POLICY	-	-	-	-

**DEP ATTRITION: FY87 COHORT LOGIT MODEL RESULTS
AND VARIABLE MEANS (Continued)**

VARIABLE	COEFFICIENT	(T-STAT)	dp/dx: SLOPE OF CONDITIONAL MEAN FUNCTION	MEAN
-----	-----	-----	-----	-----
<u>Recruiter attributes</u>				
MALER	.798E-01	(.906)	.110E-01	.958
CPO	-.502E-01	(- .976)	-.696E-02	.133
RECQTR	.552E-02	(1.250)	.765E-03	5.263
BLACKR	.168E-01	(.311)	.233E-02	.150
HISPR	.108	(1.135)	.150E-01	.035
MG13UR	-.352E-01	(- .845)	-.487E-02	.753
<u>Economic variables</u>				
UNEMP	.445E-02	(.461)	.616E-03	6.613
DIRDOL	-.146E-01	(- 1.393)	-.202E-02	.955
NEWDOL	-.539E-02	(- .553)	-.746E-03	3.077
NTVDOL	-.364E-02	(- 1.297)	-.504E-03	13.650
MAGDOL	.202E-01	(1.568)	.2803-02	3.169
MAILDL	-.182E-01	(- 1.118)	-.251E-02	1.232
SUPPDL	-.196E-01	(- .471)	-.272E-02	.136
<u>Other control variables</u>				
DISTANT	-.164E-02	(- 1.540)	-.226E-03	11.626
DENSE	.135E-03	(1.686)	.186E-04	102.961
CONSTANT	-.694	(- 3.129)		

DEP ATTRITION: SUMMARY STATISTICS

Number of observations	27042
Number of DEP attrites	4487
Log of likelihood function	-11021.0

**DEP ATTRITION: FY88 LOGIT COHORT MODEL RESULTS
AND VARIABLE MEANS**

VARIABLE	COEFFICIENT	(T-STAT)	dp/dx: SLOPE OF CONDITIONAL MEAN FUNCTION	MEAN
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<u>Individual attributes</u>				
MALE	-.704	(-16.049)	-.917E-01	.849
HSSR	.625E-01	(.787)	.815E-02	.417
HSDG	-.487	(- 6.668)	-.634E-01	.508
AGE17	-.877	(-12.167)	-.114	.127
AGE18	-.602	(-10.623)	-.784E-01	.327
AGE19	-.300	(- 5.561)	-.390E-01	.212
AGE20	-.192	(- 3.000)	-.250E-01	.112
BLACKR	-.120	(- 2.437)	-.156E-01	.200
HISP	-.988E-02	(- .156)	-.129E-02	.084
AFQT	-.268E-02	(- 2.978)	-.349E-03	57.037
<u>DEP contract variables</u>				
DAYS	.400E-02	(19.732)	.521E-03	154.450
SHORE	.933E-01	(2.351)	.122E-01	.233
ROICNT	.511	(20.064)	.666E-01	.220
ROJCNT	.132	(1.159)	.172E-01	.016
ROKCNT	.318	(9.499)	.414E-01	.137
FEB	.225E-01	(.111)	.293E-02	.092
MAR	-.214	(- 1.642)	-.279E-01	.089
APR	-.190	(- 2.145)	-.248E-01	.078
MAY	-.150	(- 1.221)	-.196E-01	.069
JUN	-.470E-01	(- .398)	-.612E-02	.093
JUL	.103	(.880)	.135E-01	.088
AUG	-.990E-01	(- .834)	-.129E-01	.094
SEP	-.279	(- 1.344)	-.364E-01	.070
OCT	-.455E-01	(- .366)	-.593E-02	.081
NOV	-.254	(- 1.786)	-.331E-01	.077
DEC	-.104	(- .842)	-.135E-01	.082
POLICY	-	-	-	-

**DEP ATTRITION: FY88 LOGIT COHORT MODEL RESULTS
AND VARIABLE MEANS (continued)**

VARIABLE	COEFFICIENT	(T-STAT)	dp/dx: SLOPE OF CONDITIONAL MEAN FUNCTION	MEAN
-----	-----	-----	-----	-----
<u>Recruiter attributes</u>				
MALER	.180	(2.033)	.235E-01	.960
CPO	-.137	(- 2.742)	-.178E-01	.143
RECQTR	-.160E-02	(- .390)	-.209E-03	6.350
BLACKR	.331E-01	(.646)	.431E-02	.161
HISPR	.176	(2.054)	.230E-01	.039
MG13UR	.219E-01	(.551)	.286E-02	.731
<u>Economic variables</u>				
UNEMP	-.284E-01	(- 2.630)	-.370E-02	5.958
DIRDOL	.492E-02	(.488)	.641E-03	1.108
NEWDOL	.364E-01	(3.530)	.475E-02	3.248
NTVDOL	-.153E-02	(- .951)	-.200E-03	12.549
RADDOL	.667E-01	(1.400)	.869E-02	.242
MAGDOL	.114E-01	(1.091)	.149E-02	1.831
MAILDL	-.113E-01	(- .807)	-.147E-02	1.716
SUPPDL	.446E-03	(.009)	.581E-04	.046
<u>Other control variables</u>				
DISTANT	-.414E-02	(- 3.687)	-.540E-03	11.287
DENSE	-.932E-04	(- 1.257)	-.121E-04	108.018
CONSTANT	-.232	(- 6.426)		

DEP ATTRITION: SUMMARY STATISTICS

Number of observations	29571
Number of DEP attrites	4559
Log of likelihood function	-11810.7

**DEP ATTRITION: FY89 COHORT LOGIT MODEL RESULTS
AND VARIABLE MEANS**

VARIABLE	COEFFICIENT	(T-STAT)	dp/dx: SLOPE OF CONDITIONAL MEAN FUNCTION	MEAN
-----	-----	-----	-----	-----
<u>Individual attributes</u>				
MALE	-.745	(-16.746)	-.918E-01	.856
HSSR	.303	(3.279)	.374E-01	.446
HSDG	-.208	(- 2.367)	-.256E-01	.485
AGE17	-.807	(-10.801)	-.994E-01	.110
AGE18	-.582	(- 9.774)	-.718E-01	.332
AGE19	-.350	(- 6.180)	-.432E-01	.233
AGE20	-.110	(- 1.679)	-.135E-01	.120
BLACK	-.271	(- 5.640)	-.334E-01	.218
HISP	-.619E-01	(- 1.011)	-.763E-02	.098
AFQT	-.719E-02	(- 7.792)	-.886E-03	55.868
<u>DEP contract variables</u>				
DAYS	.520E-02	(25.041)	.642E-03	140.033
SHORE	.364E-01	(.834)	.449E-02	.175
ROICNT	.265	(4.841)	.327E-01	.197
ROJCNT	.485	(4.729)	.598E-01	.014
ROKCNT	.131	(3.282)	.162E-01	.118
FEB	.667E-01	(.432)	.822E-02	.093
MAR	.138	(.942)	.170E-01	.092
APR	.197	(1.546)	.243E-01	.078
MAY	.257	(1.689)	.317E-01	.077
JUN	.306	(1.959)	.378E-01	.101
JUL	.319	(2.001)	.393E-01	.092
AUG	.446	(2.879)	.550E-01	.102
SEP	.325	(1.827)	.400E-01	.087
OCT	.713	(3.367)	.879E-01	.068
NOV	.173	(1.274)	.213E-01	.087
DEC	.128	(.933)	.158E-01	.088
POLICY	-	-	-	-

**DEP ATTRITION: FY89 COHORT LOGIT MODEL RESULTS
AND VARIABLE MEANS (continued)**

VARIABLE	COEFFICIENT	(T-STAT)	dp/dx: SLOPE OF CONDITIONAL MEAN FUNCTION	MEAN
-----	-----	-----	-----	-----
<u>Recruiter attributes</u>				
MALER	-.900E-01	(- .943)	-.111E-01	.969
CPO	-.553E-01	(- 1.020)	-.682E-02	.117
RECQTR	.244E-04	(.007)	.301E-05	5.690
BLACKR	.766E-01	(1.546)	.944E-02	.179
HISPR	.629E-01	(.707)	.776E-02	.040
MG13UR	-.926E-01	(- 2.389)	-.114E-01	.698
<u>Economic variables</u>				
UNEMP	-.597E-01	(- 4.259)	-.736E-02	5.549
DIRDOL	-.145E-01	(- 1.365)	-.179E-02	1.382
NEWDOL	-.958E-02	(- .703)	-.118E-02	3.012
NTVDOL	.377E-02	(.836)	.465E-03	2.685
RADDOL	.196E-02	(.402)	.242E-03	6.006
MAGDOL	.185E-01	(2.404)	.228E-02	4.141
MAILDL	.947E-02	(.541)	.117E-02	1.696
<u>Other control variables</u>				
DISTANT	-.266E-02	(- 2.493)	-.328E-03	11.539
DENSE	.846E-04	(1.176)	.104E-04	105.314
CONSTANT	-1.139	(- 4.908)		

DEP ATTRITION: SUMMARY STATISTICS

Number of observations	31050
Number of DEP attrites	4460
Log of likelihood function	-11683.9

**DEP ATTRITION: FY90 COHORT LOGIT MODEL RESULTS
AND VARIABLE MEANS**

VARIABLE	COEFFICIENT	(T-STAT)	dp/dx: SLOPE OF CONDITIONAL MEAN FUNCTION	MEAN
-----	-----	-----	-----	-----
<u>Individual attributes</u>				
MALE	-.695	(-13.988)	-.892E-01	.901
HSSR	.125	(1.334)	.160E-01	.425
HSDG	-.280	(- 3.203)	-.359E-01	.519
AGE17	-.654	(- 8.594)	-.839E-01	.117
AGE18	-.439	(- 7.172)	-.562E-01	.306
AGE19	-.210	(- 3.790)	-.270E-01	.232
AGE20	-.109	(- 1.733)	-.139E-01	.131
BLACK	-.397E-01	(- .811)	-.510E-02	.192
HISP	.166	(3.021)	.213E-01	.107
AFQT	-.259E-02	(- 2.805)	-.333E-03	58.413
<u>DEP contract variables</u>				
DAYS	.479E-02	(21.405)	.614E-03	158.228
SHORE	.167	(4.175)	.214E-01	.220
ROICNT	.268	(8.005)	.344E-01	.161
ROJCNT	.174	(1.494)	.224E-01	.014
ROKCNT	.173	(4.444)	.222E-01	.121
FEB	-.212	(- 1.165)	-.271E-01	.087
MAR	.173	(1.014)	.222E-01	.082
APR	.294	(1.913)	.377E-01	.078
MAY	.305	(2.850)	.390E-01	.077
JUN	-.994E-03	(- .006)	-.128E-03	.088
JUL	.742E-01	(.486)	.952E-02	.090
AUG	.178	(1.158)	.228E-01	.083
SEP	.360	(3.403)	.461E-01	.064
OCT	.671E-01	(.354)	.860E-02	.088
NOV	.640E-01	(.409)	.820E-02	.082
DEC	.663E-01	(.436)	.850E-02	.086
POLICY	-	-	-	-

**DEP ATTRITION: FY90 COHORT LOGIT MODEL RESULTS
AND VARIABLE MEANS (continued)**

VARIABLE	COEFFICIENT	(T-STAT)	dp/dx: SLOPE OF CONDITIONAL MEAN FUNCTION	MEAN
-----	-----	-----	-----	-----
<u>Recruiter attributes</u>				
MALER	.220	(2.154)	.282E-01	.969
CPO	-.474E-01	(- .865)	-.608E-02	.110
RECQTR	.475E-02	(1.136)	.608E-03	5.208
BLACKR	-.474E-01	(- .954)	-.608E-02	.178
HISPR	.824E-01	(1.005)	.106E-01	.044
MG13UR	-.445E-01	(- 1.159)	-.570E-02	.691
<u>Economic variables</u>				
UNEMP	-.512E-01	(- 3.006)	-.657E-02	5.486
DIRDOL	-.108E-01	(- 1.196)	-.139E-02	1.913
NEWDOL	.174E-01	(1.364)	.224E-02	3.064
NTVDOL	-.539E-02	(- 2.770)	-.691E-03	17.810
RADDOL	.118E-01	(1.798)	.151E-02	4.088
MAGDOL	.349E-01	(3.132)	.447E-02	2.449
MAILDL	-.276E-01	(- 1.459)	-.354E-02	1.602
<u>Other control variables</u>				
DISTANT	-.392E-02	(- 3.618)	-.503E-03	11.455
DENSE	.108E-03	(1.511)	.139E-04	102.697
CONSTANT	-1.591	(- 6.849)		

DEP ATTRITION: SUMMARY STATISTICS

Number of observations	29236
Number of DEP attrites	4424
Log of likelihood function	-11728.2

**DEP ATTRITION: FY91 COHORT LOGIT MODEL RESULTS
AND VARIABLE MEANS**

VARIABLE	COEFFICIENT	(T-STAT)	dp/dx: SLOPE OF CONDITIONAL MEAN FUNCTION	MEAN
-----	-----	-----	-----	-----
<u>Individual attributes</u>				
MALE	-.784	(-15.984)	-.944E-01	.902
HSSR	.933	(8.569)	.112	.309
HSDG	-.154	(- 1.568)	-.185E-01	.655
AGE17	-.734	(- 9.333)	-.884E-01	.076
AGE18	-.539	(- 9.385)	-.649E-01	.270
AGE19	-.258	(- 5.078)	-.311E-01	.230
AGE20	-.127	(- 2.320)	-.154E-01	.153
BLACK	-.156	(- 3.051)	-.188E-01	.154
HISP	-.489E-01	(- .893)	-.589E-02	.110
AFQT	-.145E-02	(- 1.535)	-.174E-03	59.700
<u>DEP contract variables</u>				
DAYS	.977E-03	(3.280)	.118E-03	115.222
SHORE	.489E-01	(1.168)	.588E-02	.193
ROICNT	.675	(22.270)	.813E-01	.145
ROJCNT	.271	(2.378)	.326E-01	.011
ROJCNT	.516	(14.037)	.621E-01	.101
FEB	-.534	(- 3.870)	-.644E-01	.112
MAR	-1.042	(- 7.757)	-.125	.122
APR	-1.026	(-10.422)	-.124	.129
MAY	-1.000	(- 7.889)	-.120	.083
JUN	-.801	(- 5.498)	-.965E-01	.055
JUL	-.774	(- 4.392)	-.932E-01	.022
AUG	-.991	(- 3.729)	-.119	.005
SEP	-	-	-	-
OCT	-.644	(- 4.397)	-.775E-01	.138
NOV	-.688	(- 4.684)	-.829E-01	.123
DEC	-.524	(- 4.149)	-.631E-01	.103
POLICY	.501	(4.794)	.604E-01	.020

**DEP ATTRITION: FY91 COHORT LOGIT MODEL RESULTS
AND VARIABLE MEANS (continued)**

VARIABLE	COEFFICIENT	(T-STAT)	dp/dx: SLOPE OF CONDITIONAL MEAN FUNCTION	MEAN
-----	-----	-----	-----	-----
<u>Recruiter attributes</u>				
MALER	-.108	(- 1.154)	-.130E-01	.971
CPO	-.250E-01	(- .477)	-.301E-02	.115
RECQTR	.235E-02	(.529)	.283E-03	6.459
BLACKR	.859E-01	(1.818)	.103E-01	.178
HISPR	.156	(2.006)	.188E-01	.046
MG13UR	.421E-01	(1.127)	.507E-02	.685
<u>Economic variables</u>				
UNEMP	.254E-02	(.151)	.306E-03	6.457
DIRDOL	.356E-02	(.513)	.429E-03	2.432
NEWDOL	.986E-02	(.747)	.119E-02	3.054
NTVDOL	.197E-02	(1.064)	.237E-03	13.295
RADDOL	-.429E-02	(- 1.043)	-.517E-03	6.510
MAGDOL	-.370E-02	(- .483)	-.446E-03	2.585
MAILDL	-.405E-01	(- 1.792)	-.487E-02	1.472
<u>Other control variables</u>				
DISTANT	-.919E-03	(- .868)	-.111E-03	11.143
DENSE	.333E-03	(5.202)	.401E-04	101.044
CONSTANT	-.604	(- 2.623)		

DEP ATTRITION: SUMMARY STATISTICS

Number of observations	33384
Number of DEP attrites	4669
Log of likelihood functions	-12549.4

Appendix C

**DEP Attrition by Month in DEP
by Beginning Educational Status**

**DEP ATTRITION BY MONTH IN DEP
BY BEGINNING EDUCATIONAL STATUS**

Months in DEP	<u>HSSR Attrited</u>		<u>HSDG Attrited</u>		<u>NHSG Attrited</u>	
	Number	Percent	Number	Percent	Number	Percent
1	477	19.25	3159	7.87	502	7.86
2	635	14.84	2589	8.01	371	8.76
3	1070	14.98	2685	10.64	357	12.15
4	1809	18.22	2366	13.21	214	12.75
5	1840	17.80	1770	12.85	218	16.24
6	2073	19.64	1570	14.92	155	15.58
7	2170	21.53	1227	17.34	54	21.60
8	2416	22.41	926	18.24	54	28.13
9	2524	23.21	877	23.36	39	28.89
10	2739	24.40	790	27.98	22	21.78
11	3264	23.59	742	30.34	28	34.57
12	2917	19.57	582	31.09	22	33.85

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